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(54) **Multi-compartment package for mixing and dispensing measured amounts of a product**

(57) The invention is directed to a package for storing and dispensing measured amounts of mixed fluid products, comprising a first section having at least one compartment with at least a first fluid product stored in said compartment; a second section separated from said first section by a breakable seal, said second section storing a second fluid product to be mixed with said first fluid product, wherein said fluid products can move through said breakable seal and mix upon compression of said first section; and a sealed port defined in said package so that said mixed fluid products can be dispensed therefrom.

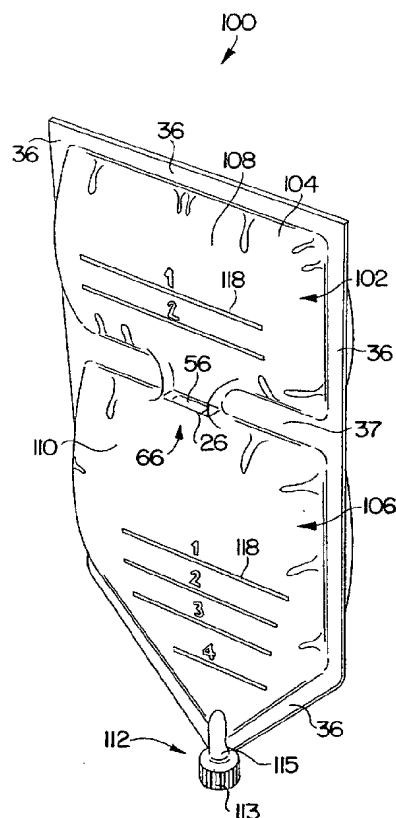


FIG. 7

Description**BACKGROUND OF THE INVENTION**

[0001] The present invention relates to a package for storing and dispensing measured amounts of a fluid substance, and particularly to a medical pack for dispensing measured or prescribed amounts of a fluid medicinal agent.

[0002] There are many instances and applications, particularly in the medical field, wherein a fluid product or agent is applied to an absorbent material, such as a gauze pad or sponge, for subsequent application. Typically, a measured or prescribed amount of the product must be introduced to and absorbed by the absorbent material prior to application. There are many applications in the medical care industry wherein ointments, salves, antiseptics, antibiotics, antifungals, and the like, must be applied to an absorbent material, such as a sponge or gauze pad, before using the product to treat a patient. The process of applying the medical product to the absorbent material is time consuming, requires storage of separate components, and can be quite messy.

[0003] In other applications, two or more liquids or flowable products must be mixed in measured amounts prior to use or application as mixed products directly or by way of the absorbent material. It has been a standard practice in the industry to maintain the components or medical agents in separate packages or containers, which entails the tedious process of subsequently measuring and mixing the components prior to use. For example, the components of many prescribed medicines must be separately stored prior to mixing by a pharmacist for final preparation of the medical agent.

[0004] Accordingly, a need has arisen for a convenient multi-compartment medical package for storing and dispensing measured amounts of at least one fluid medicinal product directly from the package wherein the product has been applied to an absorbent material or mixed with an additional product in measured amounts.

OBJECTS AND SUMMARY OF THE INVENTION

[0005] Accordingly, it is a principal object of the present invention to provide a package for storing and dispensing measured amounts of a fluid or flowable product, particularly a medicinal agent which has been introduced to an absorbent material prior to application.

[0006] An additional object of the present invention is to provide a package for storing and dispensing measured amounts of a fluid that is easy to use and has a relatively long shelf life.

[0007] And still a further object of the present invention is to provide a package for storing and dispensing measured amounts of at least two different fluid products wherein the products must be mixed in measured amounts prior to subsequent use or application.

[0008] Still another object of the present invention is to provide a versatile package for storing and dispensing measured amounts of a medical product that is reusable or can be varied in the amount of product dispensed.

[0009] Additional objects and advantages of the invention will be set forth in part in the following description, or may be obvious from the description, or may be learned through practice of the invention.

[0010] In accordance with the objects and purposes of the invention, a package is provided for storing and dispensing measured amounts of a fluid product. In one preferred embodiment of the invention, the measured amount of fluid product is first introduced to an absorbent material carried in the package, wherein the package is then opened for access to the absorbent material with the fluid product carried therein. In this embodiment, the package includes a first section having at least one compartment with at least a first fluid product stored in this compartment. A second section is separated from the first section by a first breakable seal, for example a frangible wall, wherein the fluid product can move through the seal into the second section upon compression of the first compartment. The second section stores the absorbent material that absorbs the fluid product. Means are provided for accessing the second section, such as a perforated or scored tear line, so that the absorbent material can be subsequently removed from the package after introduction of the fluid product into the second section for application and final use of the product.

[0011] The first and second sections may be defined between opposite flexible sheets of material with sealed peripheral edges. In this embodiment, the breakable seal divides the space between the sealed flexible sheets into the first and second sections. The breakable seal may comprise a frangible wall member disposed between the inner facing surfaces of the flexible sheets. In this embodiment, the frangible wall is formed of a material having a rupture point that is less than that of the flexible sheets whereby upon compression of the first section, the frangible wall ruptures allowing the flowable product to be introduced into the second section. The frangible wall can be formed from a thinner sheet of the same material as the flexible sheets, or may be formed from a different material.

[0012] In still a further embodiment, the first section may comprise an additional second compartment separated from the first compartment by a second breakable seal, for example an additional frangible wall. The second compartment may be used to store an additional fluid product to be mixed with the first fluid product prior to introduction of the mixed products into the second section of the package. In this embodiment, the first section is compressed in a manner so that the second breakable seal ruptures allowing the two fluid products to mix. After adequate mixing of the products, the first section is again compressed so that the first seal ruptures allowing the mixed products to flow into the second

compartment.

[0013] It may be preferred that not all of the fluid product, whether a single product or mixed products, be introduced into the second compartment. In this case, it may be preferred to provide a metering device, such as a resealable valve, in the seal between the first and second sections. In this manner, a limited desired portion of the fluid product can be controllably introduced into the second section of the package upon compression of the first section. Upon release of a compressive force on the first section, the valve or metering device reseals.

[0014] In an alternative preferred embodiment of the invention, the package is used to store measured amounts of two separate fluid products, and to dispense the products in a controlled manner once they have been mixed within the package. In this embodiment, a first section is provided having at least one compartment with at least a first fluid product stored in the compartment. A second section is separated from the first section by a breakable seal and contains a second fluid product to be mixed with the first fluid product. Upon compression of either of the first or second sections, the breakable seal ruptures and the two fluid products are free to mix or merge. A sealable port is defined in the package so that the mixed fluid products can be subsequently dispensed from the package. In a preferred embodiment, the sealable port is a capped or resealable valve defined in the second section of the package.

[0015] The package is thus particularly useful when only a limited amount of the first fluid product is to be introduced and mixed with the second fluid product. For example, a valve or metering device may be provided in the breakable seal so that only a portion of the first fluid product is allowed to mix with the second fluid product. This metering device may comprise any manner of valve or similar device, such as a conventional flap valve. In this manner, it may be preferred to provide graduation or meter marks on the first section to accurately determine the amount of first fluid product introduced into the second section. Likewise, it may also be preferred to include graduation or meter marks on the second section to accurately dispense only a measured amount of the mixed fluids from the package.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

Figure 1 is a perspective view of a preferred embodiment of the package according to the invention; Figure 2 is a side view of the package illustrated in Fig. 1 taken along the lines indicated; Figure 3 is a perspective view of an alternative preferred embodiment of the package according to the invention; Figure 4 is a side view of the breakable seal incorporating a valve member taken along the lines indicated in Fig. 3;

Figure 5 is a perspective view of an additional preferred embodiment according to the invention;

Figure 6 is a perspective view of a preferred alternative embodiment of the package according to the invention wherein two separate fluid products are stored in the package for subsequent mixing prior to dispersion; and

Figure 7 is an alternative view of the package similar to that shown in Fig. 6.

DETAILED DESCRIPTION

[0017] Reference will now be made in detail to the presently preferred embodiments of the invention, one or more examples of which are illustrated and described in the drawings. Each example is provided to explain the invention, and is not meant as a limitation of the invention. For example, features illustrated or described as part of one embodiment can be used with another embodiment to yield still a further embodiment. It is intended that the present description include such modifications and variations as come within the scope and spirit of the invention as appreciated by those skilled in the art.

[0018] The presently preferred embodiments of the package according to the invention are illustrated generally in Figs. 1 through 7. For purposes of explanation, the invention will be described as it pertains to storing and dispensing medical products. For example, the fluid or liquid products described herein may comprise any manner of medicinal ointments, salves, liquids, etc. Similarly, the absorbent material described herein can comprise any manner of medical pad, gauze, swabs, sponge, etc. It should be appreciated, however, that the present invention is not limited to application in the medical industry, and has any number of applications in the residential and industrial fields. The package is described herein as a medical product for ease of illustration and explanation only.

[0019] Referring to the figures, in a preferred embodiment of the invention, package 10 is constructed from opposing sheets of a flexible, plastic or vinyl film material. An upper or first sheet 30 is adhered to an opposite or bottom sheet 32 around sealed peripheral edges 36. The shape of package 10 is generally illustrated as rectangular, but can comprise any shape or form. The flexible sheets of material 30, 32 can be a film of material made of polyethylene, polypropylene, or polyvinylchloride. However, the material composition of sheets 30, 32 is not intended to act as a limitation on the scope of the present invention. Essentially, the sheets can be made of any one of a number of relatively strong, but pliable materials known and used in the arts. Also, package 10 is not limited to a flexible or pliable material, but can comprise a rigid structure formed of any manner of conventional materials.

[0020] Referring again to the figures, package 10 defines a first section, generally 18, and a second section, generally 24. First section 18 includes at least one com-

partment 20 having a first fluid or liquid product 12 stored therein. Second section 24 contains a second product stored therein, for example an absorbent material, generally 16. In the embodiment of Fig. 1, material 16 is a gauze material. In the embodiment of Fig. 2, absorbent material 16 is illustrated as a plurality of swabs 64. In the embodiment illustrated in Fig. 5, absorbent material 16 is illustrated as a sponge 62. The present invention is not limited to any particular type of absorbent material, or any other type of product stored in second section 24.

[0021] Second section 24 is separated from first section 18 by a first "breakable" seal, generally 26. Seal 26 is "breakable" in that upon a predetermined compressive force being applied to first section 18, seal 26 opens or breaks under hydraulic pressure caused by the fluid product 12 pressing against the seal. It should be understood that, as explained in further detail below, seal 26 may also have the capability of resealing upon release of the compressive force on first section 18.

[0022] Referring particularly to Fig. 2, first breakable seal 26 may comprise an intermediate frangible wall member 38 that is adhered or sealed to oppositely facing inner surfaces 72, 73 of sheets 30, 32 at seal locations 45, 43. Frangible wall 38 is formed of a material having a rupturing or breaking point under hydraulic pressure that is less than sheets 30, 32 and seals 45, 43. Frangible wall 38 may be formed as a thin sheet of the same material as sheets 30, 32, or may be formed from a different material. Thus, referring to Figs. 1 and 2, upon an operator compressing or squeezing first section 18, fluid product 12 is forced against frangible wall 38 causing the wall to rupture and the fluid product 12 to be introduced into second section 24 to mix with the product stored therein, for example to be absorbed by absorbent material 16.

[0023] In an alternative embodiment of the invention particularly illustrated in Fig. 5, seal 26 may comprise an intermediate sealed section or portion of sheets 30, 32. For example, referring to Fig. 5, first section 18 is separated from second section 24 by a relatively wide intermediate seal 37 of sheets 30, 32. Breakable seal 26 is defined as a relatively narrow seal line between sheets 30, 32. In this embodiment, upon compression of section 18, seal 26 between sheets 30, 32 ruptures allowing flowable product 12 to be squeezed or forced into second section 24 between the intermediate seal sections 37.

[0024] As used herein, the "seals" can be formed in any conventional process that is particularly suited for the type of materials used to form package 10. For example, in the preferred embodiments, the seals are formed by a relatively strong heat seal. However, any method of sealing the sheets or materials can be used, such as an RF seal, ultrasonic seal, glue, etc. Such seals and the process for forming the seals are well known by those skilled in the art.

[0025] Package 10 also includes means 28 for accessing second section 24 after the fluid product 12 has

been introduced therein. Any manner of known seals or accessing means can be utilized in this regard. For example, referring to Fig. 1, access means 28 comprises a perforated or scored tear line 48. In this embodiment, an operator simply tears the end portion of the sealed sheets 30, 32 along line 48 thereby providing access into section 24 to remove the absorbent material 16. In an alternative preferred embodiment particularly illustrated in Figs. 3 and 4, access means 28 can comprise a resealable seal 46. Resealable seal 46 can comprise any conventional resealable device, such as an interengaging male/female seal, zipper, adhesive seal, or the like. The present invention is not limited to any particular type of resealable seal.

[0026] The embodiment wherein package 10 utilizes a resealable seal as the access means into second section 24 may be particularly useful wherein a plurality of pieces of absorbent material, such as a plurality of swabs 64 illustrated in Fig. 2, are stored in second section 24. In this embodiment, fluid product 12 can be absorbed by all of the swabs 64 at one time. However, the operator need not remove all of the swabs, but can selectively remove the swabs as needed with the capability of resealing package 10. Any number of additional uses of this embodiment of the package are within the scope and spirit of the invention.

[0027] Referring particularly to Figs. 1 and 2, an alternative preferred embodiment of the invention is illustrated wherein first section 18 comprises a second compartment 22 separated from first compartment 20 by a second breakable seal 44. As described above, seal 44 can comprise any manner of sealing device or mechanism. In the embodiment illustrated in Fig. 2, second seal 44 comprises an extension of frangible wall 38 sealed between sheets 30, 32 at seal points 43 and 42. This embodiment of the invention is particularly useful wherein the end product to be introduced into second section 24 comprises two or more constituents that must be individually stored prior to mixing and use thereof. For example, certain ointments, salves, antiseptic or antibiotic solutions, etc., are formed from mixed components or agents and have a relatively short effective life once mixed. In this situation, the ingredients or components can be separately maintained and stored in package 10 over a relatively long shelf life, and then mixed within package 10 just prior to use or application.

[0028] Referring again to Fig. 2, the embodiment of the invention wherein two products are stored within first section 18 is utilized by an operator first pressing or compressing a forward part of section 18 forcing second fluid material 14 to rupture or break seal 44. Once seal 44 is broken, products 12 and 14 are free to mix. The operator then again presses or compresses section 18 causing seal 26 to break or rupture wherein the mixed products are then introduced to the absorbent material 16 within section 24. Seals 26 and 44 can be formed from the same frangible wall member 38, as illustrated in Fig. 2. However, in this embodiment, the operator

must be careful to compress the portion of first section 18 defining second compartment 22 first so that the seal 44 will rupture before seal 26. In an alternative embodiment, however, seal 44 may comprise a frangible wall material having a rupture point less than that of seal 26 so that seal 44 is ensured to rupture prior to seal 26 upon compression of any portion of first section 18.

[0029] The present invention is particularly useful wherein a known or measured quantity of fluid product is introduced into first section 18 prior to sealing edges 36 defining first section 18. For example, it is often desired or prescribed to use only a limited amount of antiseptic or antibiotic solution on a given area of a patient at any given time. In this situation, the prescribed or desired amount can be pre-stored in package 10.

[0030] In other situations, however, it may be desired to utilize only a portion of the fluid product stored in first section 18. In this situation, it may be desired to incorporate a metering or valve device, generally 66, as part of breakable seal 26. For example, referring to Figs. 3 and 4, seal 26 may include a valve device 56 that permits introduction of product 12 into second section 24 only so long as a compressive force is applied to first section 18. In the embodiment illustrated, valve 56 comprises a conventional flap valve having a rigid resilient flap 59 that seats against a surface 61. In an "at-rest" or static environment, fluid product 12 does not exert enough pressure against flap 59 to open the valve. However, as illustrated in Fig. 4, upon compression of section 18, hydraulic forces push flap 59 away from seat 61 allowing introduction of product 12 into second section 24. It should be appreciated that any manner of resealable valve devices can be utilized in this regard and that the flap valve illustrated in Figs. 3 and 4 is but an example of any number of suitable devices.

[0031] It may also be desired to incorporate graduation or metering marks on the surface of one of the sheets 30, 32, defining first compartment 20 of first section 18 so that the operator can accurately determine the amount of product 12 introduced through valve 56 into second section 24. Such marks 118 are illustrated in the embodiments of Figs. 6 and 7.

[0032] It may also be desired to have the capability of introducing an external substance or agent into one of the compartments of package 10. In this situation, it may be preferred to incorporate a sealable access into one of the compartments, for example first compartment 20, for introducing the additional element or product. Fig. 6 illustrates a package 100 according to the invention wherein a first compartment access port 68 is provided. In the embodiment illustrated, port 68 is a conventional syringe port wherein a syringe 69 can be used to introduce an additional substance or agent into the first compartment of package 10. It should be understood that access port 68 can be provided in any of the embodiments of the invention illustrated and described herein, and that any manner of conventional ports can be utilized in this regard.

[0033] Additional preferred embodiments of the invention are illustrated generally in Figs. 6 and 7. These embodiments are particularly useful wherein it is desired to separately store at least two different fluid products in package 100, wherein the products can be subsequently mixed within package 100 and dispensed from the package. Many of the components and elements illustrated in Figs. 6 and 7 are identical to those illustrated and described with regards to Figs. 1 through 5 and like reference numerals are used in this regard. In general, package 100 utilizes a first section 102 defining at least a first compartment 104 having a first fluid product 108 stored therein. Package 100 includes a second section 106 defining a compartment with a second fluid product 110 stored therein. A breakable seal 26 separates the two compartments. The seal 26 can be provided as described above.

[0034] Package 100 also includes a sealed port 112 through which the mixed products are dispensed from the package. Preferably, port 112 is a resealable device and, for example, includes a dispensing nozzle member 115 with a sealable cap 113. Any manner or construction of sealable devices can be utilized in this regard.

[0035] In the embodiment of Fig. 7, breakable seal 26 incorporates the metering valve or device 66, illustrated as flap valve 56. In this embodiment, measured amounts of product 108 can be introduced into second section 106 and mixed with fluid product 110. In this regard, graduation marks 118 can be provided on the sheets of material defining first section 102 so that the operator can accurately measure the amount of product being introduced into the second section. Likewise, graduation marks 118 can be provided on second section 106 so that the operator can accurately measure the amount of mixed products being dispersed from package 100.

[0036] It should be appreciated by those skilled in the art that various modifications and variations can be made in the package according to the present invention without departing from the scope or spirit of the invention. For example, the package is not limited to any particular type of product stored therein. In certain applications, an absorbent product may be desired, and in other applications, fluid or liquid types of products may be stored and mixed within the package. It is intended that the present invention include such modifications and variations as come within the scope and spirit of their appended claims and their equivalents.

Claims

1. A package for storing and dispensing measured amounts of mixed fluid products, comprising:

a first section having at least one compartment with at least a first fluid product stored in said compartment;

a second section separated from said first section by a breakable seal, said second section storing a second fluid product to be mixed with said first fluid product, wherein said fluid products can move through said breakable seal and mix upon compression of said first section; and

5

a sealed port defined in said package so that said mixed fluid products can be dispensed therefrom.

10

2. The package as in claim 1, wherein said first and second sections are defined between opposite flexible sheets of material sealed around peripheral edges thereof, said breakable seal dividing a space between said sealed flexible sheets into said first and second sections. 15
3. The packages as in claim 2, wherein said breakable seal comprises a wall member disposed between said flexible sheets, said wall member opening under hydraulic pressure upon compression of said first section. 20
4. The package as in claim 2, wherein said breakable seal comprises a seal between said flexible sheets, said seal rupturing under hydraulic pressure upon compression of said first section. 25
5. The package as in claim 2, wherein said breakable seal comprises a resealable valve member so that a metered amount of said first fluid product can be introduced into said second section. 30
6. The package as in claim 5, further comprising graduation marks on said first section so that a measured amount of said first fluid product can be introduced into said second section through said valve member. 35
7. The package as in claim 1, further comprising graduation marks on said second section so that a measured amount of said mixed fluid products can be dispensed from said second section. 40
8. The package as in claim 1, further comprising a sealable access into said first section for introducing said first fluid product into said first section. 45
9. The package as in claim 8, wherein said sealable access comprises a syringe port. 50
10. The package as in claim 1, wherein said sealed port comprises a resealable access port. 55

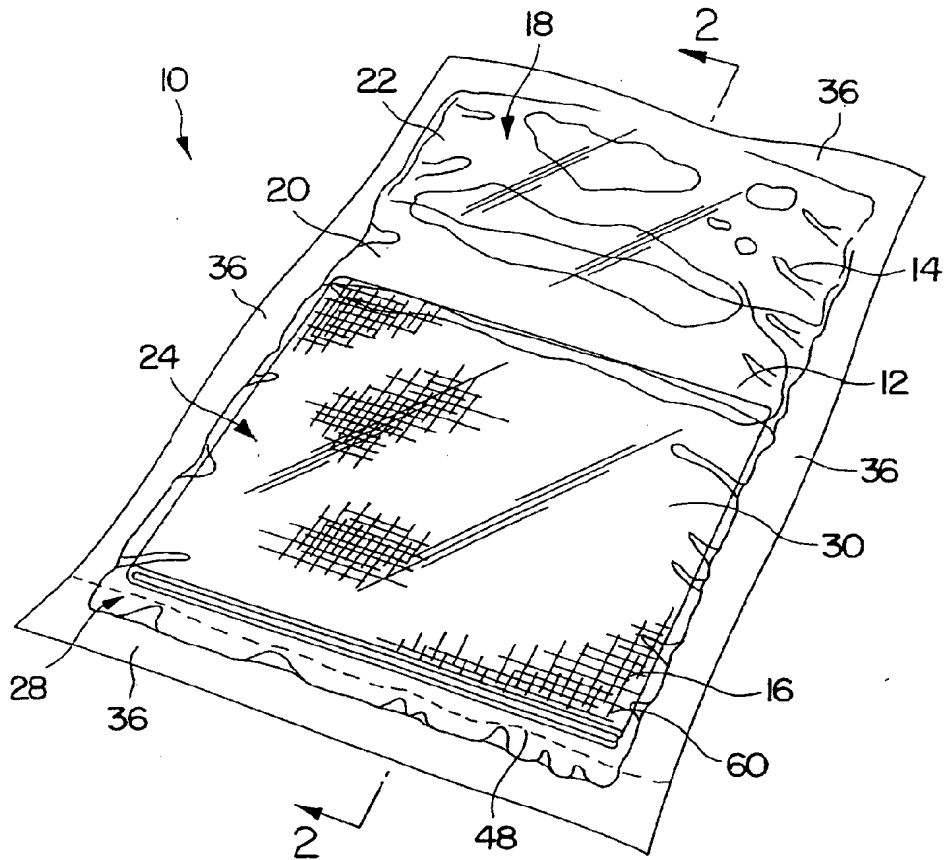


FIG. 1

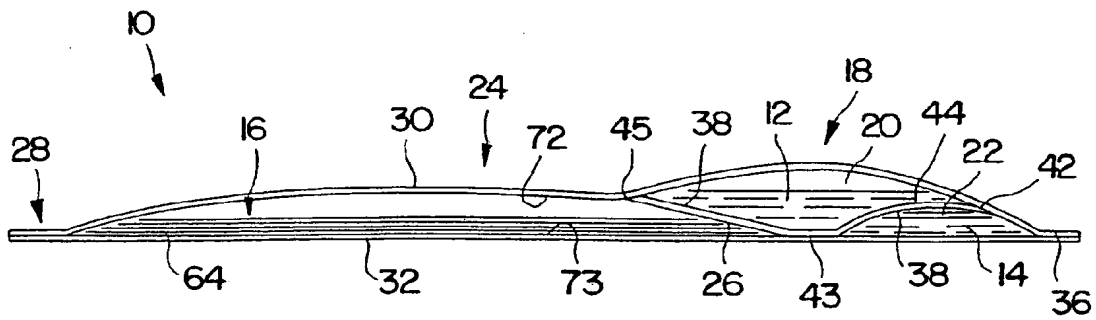


FIG. 2

